Observation of the dynamics of the dust structure formed in a dust trap in a double electric layer in a magnetic field up to 10000G.

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A study of dusty plasma in a glow discharge under the influence of a strong magnetic field is carried out. The magnetic field values above 3000 G, at which the magnetization of neon ions is achieved under our conditions, are of interest. For observation, a dust trap which does not change the position when the magnetic field changes was chosen.
There is a potential trap in the area of the change in the cross-section of the current channel formed by placing into the discharge tube a dielectric insert with special form for the stabilizing the discharge. In the literature this area is called a double electric layer or a low-voltage arc. It was found in [1] that in this area the dust trap is able to hold a ring shape structure with a large number of particles.
In this work the investigations of the dynamics of the dust structure, which levitating in a glow discharge in a dust trap in a double electric layer are presented. It has been found that the structure has the shape of a ring with its center coincident with the axis of the hole in the dielectric insert. In the external longitudinal magnetic field the dust particles are rotating. The value of the angular velocity of each particle is depended on the radius at which the particle is located. Earlier the observations of dust structures in this trap were carried out in magnetic fields up to 400 G [2]. In this paper, research in a magnetic field up to 10,000 G is presented. There is a sharp increase in the angular velocity of rotation of the dust structure with increasing magnetic induction. With a magnetic field of 3000 G, the angular velocity reaches 15 rad / s. With further increase of the magnetic field, the angular velocity remains constant.
Finally, we discuss the possible causes of the rotation of the dust particles such as the ion drag force and the effect of dragging by rotating gas owing to Ampere's force [3.4] in a longitudinal magnetic field.

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